

IN THE CLAIMS:

Claims 1-5 (canceled)

Claim 6 (currently amended) A substrate cleaning apparatus for cleaning a substrate at a substantially constant rate, comprising:

a substrate cleaning bath to contain therein a substrate cleaning liquid comprising at least one liquid selected from a first group consisting of an aqueous solution of ammonium fluoride and a mixture of an aqueous solution of ammonium fluoride and hydrofluoric acid;

a substrate carrier for holding the substrate when dipping the substrate in the substrate cleaning bath;

measuring means for measuring characteristics of said cleaning liquid in said substrate cleaning bath, the characteristics being relative to the hydrofluoric acid concentration of said cleaning liquid;

fluid water feeding means for feeding at least one fluid selected from a second group consisting of ammonia and aqueous ammonia water from a fluid water source to said substrate cleaning bath;

a circulation system configured to circulate said cleaning liquid from the substrate cleaning bath, through said measuring means, and back to said substrate cleaning bath during cleaning of the substrate in the substrate cleaning bath; and

control means for processing configured to process a signal from said measuring means during cleaning of the substrate in the substrate cleaning bath to control the feeding of the fluid water from said fluid water source to the substrate cleaning bath by way of said fluid water feeding means during cleaning of the substrate in the substrate cleaning bath so that the rate at which the substrate is cleaned remains substantially constant.

Claim 7 (canceled)

Claim 8 (previously presented) The substrate cleaning apparatus according to Claim 6, wherein said measuring means comprises means for measuring at least one wavelength characteristic selected from the group consisting of an absorbance at a predetermined wavelength, an infrared absorption spectrum, an ultraviolet absorption spectrum, and an index of refraction.

Claim 9 (previously presented) The substrate cleaning apparatus according to Claim 6, wherein said measuring means comprises means for measuring at least one physical value selected from the group consisting of a specific gravity and a transmittance.

Claim 10 (previously presented) The substrate cleaning apparatus according to Claim 6, wherein said measuring means comprises means for measuring an electric conductivity.

Claim 11 (previously presented) The substrate cleaning apparatus according to Claim 6, wherein said measuring means comprises at least one measurement means selected from the group consisting of a moisture titrator and liquid (ion) chromatography.

Claim 12 (previously presented) The substrate cleaning apparatus according to Claim 6, wherein said measuring means measures hydrofluoric acid concentration of said cleaning liquid.

Claim 13 (original) The substrate cleaning apparatus according to Claim 12, wherein said measuring means comprises means for measuring at least one wavelength characteristic selected from the group consisting of an absorbance at a predetermined wavelength, an infrared absorption spectrum, an ultraviolet absorption spectrum, and an index of refraction.

Claim 14 (withdrawn) The substrate cleaning apparatus according to Claim 12, wherein said measuring means comprises means for measuring at least one physical value selected from the group consisting of a specific gravity and a transmittance.

Claim 15 (withdrawn) The substrate cleaning apparatus according to Claim 12, wherein said measuring means comprises means for measuring an electric conductivity.

Claim 16 (withdrawn) The substrate cleaning apparatus according to Claim 12, wherein said measuring means comprises at least one measurement means selected from the group consisting of a moisture titrator and liquid (ion) chromatography.

Claim 17 (canceled)

Claim 18 (canceled)

Claim 19 (currently amended) The substrate cleaning apparatus according to Claim 18 23, wherein said measuring means is adapted to measure at least one wavelength characteristic selected from a group consisting of an absorbance at a predetermined wavelength, an infrared absorption spectrum, an ultraviolet absorption spectrum, and an index of refraction.

Claim 20 (withdrawn) The substrate cleaning apparatus according to Claim 18, wherein said measuring means is adapted to measure at least one physical value selected from a group consisting of a specific gravity and a transmittance.

Claim 21 (withdrawn) The substrate cleaning apparatus according to Claim 18, wherein said measuring means is adapted to measure an electrical conductivity.

Claim 22 (withdrawn) The substrate cleaning apparatus according to Claim 18, wherein said measuring means comprises at least one measurement means selected from a group consisting of a moisture titrator and liquid chromatography.

Claim 23 (new) The substrate cleaning apparatus according to Claim 6, wherein said measuring means measures hydrofluoric acid concentration of the cleaning liquid in said substrate cleaning bath during cleaning of the substrate.

Claim 24 (new) A substrate cleaning apparatus for cleaning a substrate at a substantially constant rate, comprising:

a substrate cleaning bath to contain therein a substrate cleaning liquid;

a fluid feeding system including a fluid source, a fluid line connecting the fluid source to the substrate cleaning bath, and a pump connected to the fluid line between the fluid source and the substrate cleaning bath for selectively pumping fluid from the fluid source to the substrate cleaning bath;

a controller operatively connected to the pump of the fluid feeding system and configured to control the pump to pump the fluid from the fluid source to the substrate cleaning bath at predetermined amounts during cleaning of the substrate in the substrate cleaning bath so that the rate at which the substrate is cleaned remains substantially constant.

Claim 25 (new) The substrate cleaning apparatus according to Claim 24, wherein the controller is configured to control the pump to pump the fluid to the substrate cleaning bath at amounts based on information regarding expected changes the cleaning liquid will undergo during cleaning of the substrate.

Claim 26 (new) The substrate cleaning apparatus according to Claim 24, wherein the controller is configured to control the pump to pump the fluid from the fluid source to the substrate cleaning bath intermittently at predetermined amounts and at

predetermined intervals during cleaning of the substrate in the substrate cleaning bath so that the rate of cleaning the substrate is kept substantially constant.

Claim 27 (new) The substrate cleaning apparatus according to Claim 24, wherein the controller is configured to control the pump to pump the fluid from the fluid source to the substrate cleaning bath continuously at predetermined amounts during cleaning of the substrate in the substrate cleaning bath so that the rate at which the substrate is cleaned remains substantially constant.

Claim 28 (new) The substrate cleaning apparatus according to Claim 24, wherein said fluid source includes water and the controller is configured to process the signal from the measuring unit during cleaning of the substrate to control feeding of water to the substrate cleaning bath during cleaning of the substrate to keep the rate of cleaning the substrate substantially constant.

Claim 29 (new) The substrate cleaning apparatus according to Claim 24, wherein said fluid source includes aqueous ammonia and the controller is configured to process a signal from the measuring unit during cleaning of the substrate to control feeding of aqueous ammonia to the substrate cleaning bath during cleaning of the substrate to keep the rate of cleaning the substrate substantially constant.

Claim 30 (new) The substrate cleaning apparatus according to Claim 24, further including a circulation system configured to circulate the cleaning liquid from the substrate cleaning bath and back to said substrate cleaning bath during cleaning of the substrate in the substrate cleaning bath.

Claim 31 (new) The substrate cleaning apparatus according to Claim 24, further including a substrate carrier for holding the substrate when dipping the substrate in the substrate cleaning bath.

Claim 32 (new) A substrate cleaning apparatus for cleaning a substrate at a substantially constant rate, comprising:

- a substrate cleaning bath to contain therein a substrate cleaning liquid;
- a fluid feeding system including a fluid source, a fluid line connecting the fluid source to the substrate cleaning bath, and a pump connected to the fluid line between the fluid source and the substrate cleaning bath for selectively pumping fluid from the fluid source to the substrate cleaning bath;

- measuring unit for measuring characteristics of the cleaning liquid in the substrate cleaning bath;

- a circulation system configured to circulate said cleaning liquid from the substrate cleaning bath, through said measuring unit, and back to said substrate cleaning bath during cleaning of the substrate in the substrate cleaning bath;

- a controller operatively connected to the pump of the fluid feeding system and configured to process a signal from the measuring unit during cleaning of the substrate in the substrate cleaning bath to control feeding of water from the water source to the substrate cleaning bath during cleaning of the substrate so that the rate at which the substrate is cleaned remains substantially constant.

Claim 33 (new) The substrate cleaning apparatus according to Claim 24, wherein said fluid source includes water and the controller is configured to process the signal from the measuring unit during cleaning of the substrate to control feeding of water to the substrate cleaning bath during cleaning of the substrate to keep the rate of cleaning the substrate substantially constant.

Claim 34 (new) The substrate cleaning apparatus according to Claim 24, wherein said fluid source includes aqueous ammonia and the controller is configured to process a signal from the measuring unit during cleaning of the substrate to control feeding of aqueous ammonia to the substrate cleaning bath during cleaning of the substrate to keep the rate of cleaning the substrate substantially constant.